

Minnesota 2025 Energy Action Plan Draft Outline

December 8, 2015

Guiding Questions for Discussion

- Does the detailed outline accurately capture the strategies you have been discussing in the stakeholder advisory committee? Is anything missing?
- For each strategy:
 - Who (organization) will own/lead the strategy?
 - Are the key success factors and drivers right?
 - What are potential funding sources?
 - What are the top (2-3) indicators or metrics?
 - Any sources of data that you have or know of?
 - What is the timeline of progress on this strategy?
 - Are the cross-sector opportunities correctly identified?
 - Are the next steps outlined below the right ones? What additional actions are required to capture the opportunity?
 - What are the key ongoing initiatives? Any missing?
 - Is additional study is needed?
 - Work that needs to be done for this report?
 - Work that would be a recommendation?

Minnesota 2025 Energy Action Plan Draft Outline

- I. Introduction and Purpose
- II. Background and Scope
- III. [Transportation](#) (pages 3-8)
 - a. [Electrify buses](#)
 - b. [Electrify fleets \(private fleets and state/municipal fleets\)](#)
 - c. [Increase adoption of personal EVs](#)
- IV. [Electricity Supply and Grid Modernization](#) (pages 9-15)
 - a. Encourage grid modernization
 - i. [Deploy advanced metering infrastructure \(AMI\)](#)
 - ii. [Enable smart inverter functionality](#)
 - b. Evolve tariffs/pricing mechanisms
 - i. [Adopt time-based rates](#)
 - ii. [Expand and improve utility green power options](#)
- V. [Efficient Buildings and Thermal Energy](#) (pages 16-22)
 - a. [Increase adoption of building energy benchmarking programs](#)
 - b. [Adopt net-zero energy or low-energy goals for new buildings](#)
 - c. [Enhance energy data access through Green Button](#)
 - d. [Promote behavioral energy efficiency strategies](#)
 - e. [Support district energy and combined heat and power \(CHP\)](#)
- VI. [Industry and Agriculture](#) (pages 22-28)
 - a. [Commercialize advanced biofuels and biobased chemicals](#)
 - b. [Capture organic feedstocks through anaerobic digestion \(AD\)](#)
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 - d. [Create an Advanced Energy Cluster Organization](#)
- VII. [Local Planning and Action](#) (pages 29-32)
 - a. [Incorporate energy into local government policy, planning, and regulatory frameworks](#)
 - b. [Increase local government action through voluntary best practices](#)
- VIII. Cross-sector opportunities and synergies (page 33)
- IX. Taking a Step Back: What's Possible?
- X. [A Few Innovative Ideas for Further Consideration](#)

III. **Transportation**

a. **Electrify buses**

Why this strategy is included: Public transit is a logical avenue for electrification. In addition to the benefits of reduced fuel use and greenhouse gas emissions, electric buses in particular would result in less air and noise pollution. Local governments have the authority to act on this opportunity.

i. **Specific recommendations for strategy implementation**

1. Validate lifecycle cost studies/estimates for electric buses
2. Demonstrate electric buses on transit routes in Minnesota (include suburban and urban routes)
3. Investigate opportunities for electric school buses
 - a. Identify champion to talk with interested school districts and bus providers
 - b. Connect with school districts in California and other states that have had success
 - c. Identify potential pilots, secure funding, and implement.
4. Convene workshop to guide cities/counties through electric bus procurement.
 - a. Identify entity that can convene workshop. Contact transit agencies and providers and give pitch. Connect with leaders in electric buses and gather insights while shaping workshop agenda
 - b. Hold 1-day workshop and develop clear commitments and next steps

ii. **Success Factors**

1. Demonstrate financial case for electric buses
2. Show that there are no major operational challenges
3. Establish commitment from transit agencies for implementation

iii. **Identified Champions/Key Participants** (by strategy #)

- 1.
- 2.
- 3.
- 4.

iv. **Metrics**

1. Number of electric buses (or percentage of fleet)
2. Number of Minnesota cities/counties with electric bus program
3. VMT in electric buses compared with conventional buses

4. Carbon intensity of bus transportation (carbon emissions per passenger mile traveled or per vehicle mile traveled)
5. Energy saved (in kWh or barrels of oil equivalent) due to higher efficiency
6. Greenhouse gas emissions reductions (CO2 and other criteria pollutants)
7. Cost savings due to energy savings or operational savings (in \$)

v. Additional information

1. Cross sector opportunities and synergies

- a. Green power options – specific rates/programs for electric vehicle charging; EV owners may opt to charge their vehicles with green power

2. Ongoing MN initiatives

- a. In February 2015, [Duluth was awarded an FTA grant](#) of \$6.3 million for 6 battery electric buses and 2 fast-charging stations. The FTA grant was supplemented by \$1.1 million in local funding. The buses are currently being manufactured by Proterra Manufacturing in Greenville, SC.
- b. Metro Transit held [demonstrations](#) of electric buses in April and May of 2015.

3. Other related resources

4. Funding sources identified

- a. FTA grants through [Low/No Emission Vehicle Deployment Program](#) available for nonattainment and maintenance areas under the Clean Air Act.

b. Electrify fleets (private fleets and state/municipal fleets)

Why this strategy is included: Focusing on fleets for electrification is strategic, since fleet vehicles tend to have higher usage than personal vehicles and are replaced more frequently. Further, a few decision-makers control the procurement of fleet vehicles.

i. Specific Recommendations for Strategy Implementation

1. Increase purchasing in state and local government fleets.
 - a. Local governments could set up a bulk purchasing arrangement in coordination with the state to help reduce the upfront cost of EVs.
2. Convene workshop to private and public sector fleet managers, fleet service providers, and leaders in EV fleets across the county to provide insights and guidance into procuring EVs.
 - a. Identify entity that can convene workshop. Contact fleet managers and service providers and give pitch. Connect with leaders in EV fleets and gather insights while shaping workshop agenda.

a motor vehicle that is capable of being powered by cleaner fuels, or a motor vehicle powered by electricity or by a combination of electricity and liquid fuel, *if the total life-cycle cost of ownership is less than or comparable to that of other vehicles* and if the vehicle is capable of carrying out the purpose for which it is purchased.”

3. Other related resources

- a. U.S. DOE’s [Plug-In Electric Vehicle Handbook for Fleet Managers](#) guides users through PEV technology and charging infrastructure, and provides information about PEV procurement.
- b. **Funding sources identified** - (*Funding would be needed to do outreach and workshops*)

c. Increase adoption of personal EVs

Why this strategy is included: Increasing adoption of personal electric vehicles may have a greater impact than either of the two previous strategies alone, though implementation could be more difficult. Multiple decision-makers would need to be involved and the incentives and public education would have to be right to encourage significant adoption.

i. Specific Recommendations for Strategy Implementation

1. Coordinate a bulk discount program through dealerships & OEMs that could help to reduce the upfront cost of EVs
 - a. Identify a champion to talk with a number of local governments, fleet purchasers
 - b. State/local government entities issue RFP to OEMs asking them to come forward with favorable rate on EVs
 - c. All partners participate in marketing effort and heavily promote the initiative
 - d. Offer during 8-week period or discrete time period
2. Create a state rebate for purchasing of new EVs
3. Increase workplace charging stations
 - a. Identify a champion to talk with major companies and fleet operators. Investigate funding opportunities.
4. State/county/city or corporate incentives or non-monetary perks for EVs (preferential parking, reduced fees at state parks, access to HOV lanes, etc.)
 - a. Identify champion and research best practices
 - b. Involve key participants, develop plan, and implement.

5. Consider adoption of [Zero Emission Vehicle \(ZEV\) program](#), which sets a goal that an increasing percentage of vehicles sold in the state over time be zero-emission vehicles (release no emissions during operation; includes plug-in electric and hydrogen fuel cell vehicles). To date, California, Connecticut, Maine, Maryland, Massachusetts, New Jersey, New York, Oregon, Rhode Island, and Vermont have [adopted the ZEV program](#).
- ii. **Success Factors**
 1. Make electric vehicles more accessible by increasing incentives (monetary and nonmonetary) and distributing information via marketing campaign.
 2. Reduce “range anxiety” by increasing workplace charging stations and overcoming information barriers.
 - iii. **Identified Champions/Key Participants (by strategy #)**
 1. Local and state government, OEMs, and dealerships, in coordination with utilities
 2. Drive Electric Minnesota
 - 3.
 4. Drive Electric Minnesota
 5. Drive Electric Minnesota
 - iv. **Metrics**
 1. Number of electric vehicles on the road (or percentage of total)
 2. Growth rate in electric vehicle sales (% increase from 2015 to 2025)
 3. Carbon intensity of EVs (carbon emissions per passenger mile traveled or per vehicle mile traveled)
 4. Energy saved (in kWh or barrels of oil equivalent)
 5. Greenhouse gas emissions reductions (in CO₂)
 6. Cost savings due to energy savings or operational savings (in \$)
 7. Avoided energy imports in \$, kWh, or barrels of oil equivalent
 - v. **Additional Information**
 1. **Cross sector opportunities and synergies**
 - a. Green power options – specific rates/programs for electric vehicle charging; EV owners may opt to charge their vehicles with green power
 - b. Grid optimization – charging/discharging EVs in sync with renewables; could incent EV owners to charge during off-peak hours
 - c. Designing buildings to be EV-ready - vehicle charging stations (or 240V service) could be included in updated building codes (including multifamily residential)

- d. EVs as DERs - EVs could be used as a form of energy storage, dispatching energy during emergencies or to reduce peak power demands

2. Ongoing MN initiatives

- a. **Minnesota does not currently offer rebates or tax incentives for EVs.** During the last legislative session, [a bill](#) was introduced that would offer a \$2500 rebate on the purchase of new plug-in electric vehicles.
- b. **Electric vehicle charging tariff** - Subd. 2.Required tariff. (a) By February 1, 2015, each public utility selling electricity at retail must file with the commission a tariff that allows a customer to purchase electricity solely for the purpose of recharging an electric vehicle.
 - i. The tariff must: (1) contain either a time-of-day or off-peak rate, as elected by the public utility; (2) offer a customer the option to purchase electricity: (i) from the utility's current mix of energy supply sources; or (ii) entirely from renewable energy sources, subject to the conditions established under section [216B.169, subdivision 2](#), paragraph (b), and subdivision 3, paragraph (a)
- c. **Plug-In Electric Vehicle Charging Rate Reduction** - [Dakota Electric](#) offers discounted rate for electricity used to charge EVs during off-peak times. [Connexus Energy](#) offers a reduced rate and a \$270 rebate to install a time-of-day meter.
- d. **Drive Electric Minnesota's Zero Emission Charging Challenge** aims to power all public charging stations with Windsource® or solar generated electricity.
- e. **Minnesota has a well-developed public charging infrastructure**, with 433 public EV charging outlets (including 283 Level-2 charging outlets), according to the U.S. Department of Energy [Alternative Fuels Data Center](#).

3. Other related resources

- a. Recently, Adams, Boulder, and Denver counties in Colorado [coordinated and administered a bulk discount program](#) on Nissan LEAF (EVs) through Nissan North America and local Nissan dealerships, leading to unprecedented sales. At Boulder Nissan, LEAF sales increased almost 300% during the program. The program did not involve tax credits, subsidies, or additional regulation.

- b. A recent Idaho National Laboratory report, “[Plug-in Electric Vehicle and Infrastructure Analysis](#),” finds that despite installation of extensive public charging infrastructure, **the vast majority of EV charging is done at home and work**. Further, residential and workplace charging units are less expensive to install than public charging stations.

4. Funding sources identified

- a. **There is a federal rebate available for new EVs.** The [Qualified Plug-In Electric Drive Motor Vehicle Tax Credit](#) offers a minimum credit amount of \$2,500 and up to \$7,500, based on each vehicle's traction battery capacity and the gross vehicle weight rating.

IV. Electricity Supply and Grid Modernization

Encourage adoption of smart grid technologies - The grid paradigms of the 20th century are increasingly limited in their ability to integrate 21st century technologies effectively. Grid modernization is an important area of opportunity to maintain reliability, reduce costs for utilities and customers, and better integrate distributed energy resources with the larger grid.

a. Deploy advanced metering infrastructure (AMI)

Why this strategy is included: AMI has been identified in states across the country as a high-value strategy to drive grid modernization, integrate distributed energy resources, and facilitate better customer engagement in their electricity use. Minnesota stakeholders have identified AMI as a near-term opportunity to unlock this value and support state-level policies and goals.

i. Specific recommendations for strategy implementation

1. Utilities: Calculate the benefits and costs of all AMI values*, including:
 - a. Support for conservation voltage reduction (CVR) and volt-var optimization (VVO) programs
 - b. Reduced truck rolls
 - c. Improved system visibility for operations and planning
 - d. Improved visibility for resiliency and recovery
 - e. Cost savings for customers and the utility through time-varying rates
 - f. Improved customer engagement
 - g. Customer access to usage data
 - h. **Examples of AMI costs and benefit study best practices and results to be highlighted in Action Plan from: Ameren (IL),*

ComEd (IL), Reforming the Energy Vision (NY), US DOE, and other resources, for both IOU and nonprofit utilities.

2. Utilities: Analyze the value of deploying AMI across different feeders, and prioritize any deployment in areas with the highest net benefits.
3. Utilities: Define whether non-AMI alternatives would be able to perform some or all of the functionalities associated with AMI at lower cost.
 - a. For example, determine the extent to which already-deployed automated meter reading (AMR) technology can facilitate time-varying retail pricing programs.
4. Utilities & other stakeholders: Stay up-to-date on technology advances so that cost-benefit analysis can be refreshed as technology evolution unlocks new value.

ii. Success factors

1. Consumer advocates, utilities, environmental interests, and other stakeholders agree on the appropriate cost-benefit analysis framework to inform AMI investment plan.
 - a. Specifically, determine impacts of early replacement of non-depreciated legacy meters with AMI.
2. Focus on capturing the full value stack of AMI, and integrate with efforts to do so
 - a. For example, explicit leverage of AMI investment to support time-varying rates, enable granular customer consumption data access, facilitate least-cost integration of distributed energy resources, spark innovation by allow new businesses to use AMI data and/or functionality in new product offerings, etc.
3. Back-end support for AMI must be in place to unlock full benefits, including utility meter data management and billing systems.

iii. Identified Champions/Key Participants (by strategy #)

1. Fresh Energy
- 2.
- 3.

iv. Metrics

1. AMI adoption (# meters, % rollout), statewide and per-utility
2. Cost of deployment, statewide and per-utility
3. Reported benefits from programs that leverage AMI in \$ saved, statewide and per-utility

v. Additional information

1. **Cross-sector opportunities and synergies**
 - a. AMI can facilitate data access to drive building energy efficiency

- b. AMI can support time-varying rate programs to encourage energy efficiency and peak demand reduction
- c. AMI can aid utilities in planning for the increasing introduction of electric vehicles into the grid, and may facilitate scheduling or direct control of EV charging to minimize adverse grid impacts

2. Ongoing MN initiatives

- a. MN PUC has ongoing grid modernization proceeding that is considering similar issues.

3. Other related resources

- a. Multiple utility- and state-level studies of AMI rollout cost-effectiveness have been performed and made publicly available. Full list to be included in final Energy Action Plan.

4. Funding sources identified

b. Enable smart inverter functionality

Why this strategy is included: Smart inverters have been encouraged and/or required across the United States in utility territories with increasing PV deployment, in order to mitigate issues with high PV adoption and provide grid value. Minnesota stakeholders have identified near-term value in piloting smart inverters in the state in order to proactively support increasing PV adoption levels.

i. Specific recommendations for strategy implementation

- 1. Utilities: Initiate pilot of grid interactive inverter functionality in combination with other demand and supply-side Distributed Energy Resources.
 - a. Identify feeders with near-term avoided costs from grid interactive inverters, and prioritize deployment accordingly.
- 2. Utilities: Require interconnection contracts to include hardware that supports advanced functionality.
- 3. PUC: Open proceeding with limited scope to revise state interconnection standards to incorporate new standards and codes allowing grid interactive inverter functionality.

ii. Success factors

- 1. Lessons learned from other states' smart inverter rollouts are used to inform Minnesota's process.
- 2. Standards or requirements provide a consistent signal for utilities and/or installers to choose and install technologies.

iii. Identified Champions/Key Participants (by strategy #)

- 1. Fresh Energy
- 2.
- 3.

iv. Metrics

1. Smart inverter adoption (# inverters, % rollout), statewide and per-utility
2. Cost of deployment, statewide and per-utility
3. Reported benefits from programs that leverage smart inverters in \$ saved, statewide and per-utility

v. Additional information

1. Cross-sector opportunities and synergies

2. Ongoing MN initiatives

- a. MN CEE has proposed a project for 2016 LCCMR funding for a Geotargeted Distributed Clean Energy Initiative in partnership with Xcel energy. The project will determine the potential for geographically targeted clean, distributed energy resources (could include smart inverters) to replace planned transmission and distribution upgrades by testing the concept in three communities.

3. Other related resources

- a. Multiple utility- and state-level studies of smart inverter rollout have been performed and made publicly available. Full list to be included in final Energy Action Plan.

4. Funding sources identified

Evolving tariffs/pricing mechanisms - Retail pricing for utility customers has remained largely unchanged for decades. Now, with the increasing diversity of distributed energy technologies and evolving customer desires, there is increasing momentum to change how utilities charge for their products. For electric utilities, new pricing schemes can better reflect the costs of service, allow customers more control and engagement in how they use energy, and align incentives for customers to make investments in distributed resources that can lower their bills as well as system costs.

c. Adopt time-based rates

Why this strategy is included: Time-of-use (TOU) and other time-based rates have been used successfully to address grid cost and reliability issues across the nation.

Implementing this type of rate in Minnesota has been identified as a near-term opportunity to better engage customers in their energy use and lead to cost reductions in energy supply and grid investment.

i. Specific Recommendations for Strategy Implementation

1. Utilities: Develop and pilot new time-based rates to achieve cost and reliability objectives
2. Utilities: Drive customer adoption of new rates by educating customers about bill savings opportunities

3. Utilities: Design programs to couple enabling technology and/or behavioral approaches with new rates to enable bill and system cost reductions
- ii. **Success factors**
 1. Utility billing system must have functionality to handle time-based rates
 2. Implementation can be facilitated with AMI, but less-complex time-based rates may be supported by existing infrastructure (e.g. AMR)
 - iii. **Identified Champions/Key Participants** (by strategy #)
 - 1.
 - 2.
 - 3.
 - iv. **Metrics**
 1. Number of customers on time-based rates
 2. Change in customer load profile in response to time-base rates, e.g. % peak reduction
 3. Change in system load factor over time
 - v. **Additional Information**
 1. **Cross sector opportunities and synergies**
 - a. Time-based rates can alter incentives for building efficiency programs, e.g. by incentivizing energy conservation measures that reduce peak-period demand
 - b. Time-based rates be used to promote charging EVs at low-cost times
 - c. Time-based rates can unlock additional value from AMI deployment
 2. **Ongoing MN Initiatives**
 - a. MN Department of Commerce report on “alternative rate designs that result in rates that promote energy conservation, reduce peak demand, and/or send more accurate, useful price signals to customers,” submitted 11/10/2015 in docket [15-662](#)
 - b. e21 group-sponsored ongoing process around rate design
 - c. The [e21 Initiative Phase 1 Report](#) recommendations identified the opportunity for Time-Based Rates in Minnesota (December 2014).
 3. **Other related resources**
 - a. Extensive program evaluation, measurement, and verification has been performed for time-based rates across the country; these will be cited and summarized in the final Energy Action Plan.

2. Ongoing MN Initiatives

- a. Xcel submitted a [proposed green tariff](#) in November 2015
- b. The [e21 Initiative Phase 1 Report](#) recommendations identified the opportunity for Green Tariffs in Minnesota (December 2014).

3. Other related resources

- a. Many state-specific and national programs are in place and several studies have highlighted best practices; full Energy Action Plan will synthesize the successes and lessons learned from these programs.
- b. [Emerging Green Tariffs in US Regulated Electricity Markets](#), WRI, July 2015
- c. [Corporate Renewable Buyers Principals](#), WWF/WRI, May 2015
- d. [Above and Beyond, Green Tariff Design for Traditional Utilities](#), WRI, January 2014
- e. [Power Forward 2.0](#), WWF/Ceres/Calvert/DGA, June 2014

v. **Efficient Buildings and Thermal Energy**

a. **Increase adoption of building energy benchmarking programs**

Why this strategy is included: Tracking building energy use data is essential to ensure that new buildings are operating as predicted, to identify areas for improvement in existing buildings, and to measure the impact and persistence of actions taken, whether energy efficiency retrofits or behavior modification strategies.

i. **Specific recommendations for strategy implementation**

1. Extend access to B3 Benchmarking to all building owners.
 - a. Provide access to the Minnesota B3 Benchmarking (now available for free to all Minnesota public buildings) to all Minnesota building owners for no or low cost. SB 2030 buildings will be required to track their energy use in B3 Benchmarking; other buildings can use voluntarily.
 - b. Provide training for the Minnesota B3 Benchmarking Program to all Minnesota building owners for no or low cost.
 - c. Increase the number of supported building types in B3 Benchmarking.
2. Promote automated data transfer from utilities to building energy benchmarking programs through Green Button.
3. Promote adoption of commercial building energy disclosure ordinances by Minnesota cities and tribal communities.
4. Train building owners and funding providers to leverage benchmarking systems to target investment in areas of greatest savings potential.

ii. **Success factors**

1. Building owners understand the importance of tracking their energy use.
2. All building owners have access to at least one building benchmarking program and related training materials at low or no cost.
3. Data entry into benchmarking programs requires minimal time and effort.

iii. **Identified Champions/Key Participants (by strategy #)**

- 1.
- 2.
- 3.
- 4.

iv. **Metrics**

1. Number of Minnesota buildings in B3 Benchmarking and/or ENERGY STAR Portfolio Manager

2. Square footage of buildings in B3 Benchmarking and/or ENERGY STAR Portfolio Manager
3. Potential energy savings identified by B3 Benchmarking
4. Number of cities/tribal communities that have instituted commercial building energy disclosure ordinances

v. Additional information

1. Cross sector opportunities and synergies

- a. Advanced metering - automatic tracking of interval data

2. Ongoing MN initiatives

- a. [State of Minnesota B3 Benchmarking](#): over 8,000 public buildings track their energy use on this site and compare their performance to a code-based benchmark.
- b. [City of Minneapolis commercial building rating and disclosure ordinance 47.190](#): requires commercial buildings above 50,000 sf to report their energy use to the City.
- c. [Minnesota ENERGY STAR Challenge](#): provides participating building owners with free education and assistance regarding benchmarking, energy reduction strategies, and financing.
- d. Resource: [Integrating Benchmarking into Utility Conservation Improvement Programs to Capture Greater Energy Savings](#), prepared by Weidt Group for MN Department of Commerce, August 2014
- e. [12-1344](#) Energy Data Access/Data Privacy docket
- f. Minneapolis is partnering with Xcel and CenterPoint Energy on the Department of Energy's Better Buildings Initiative [Energy Data Accelerator](#) to facilitate better access to energy usage data. ([ACEEE](#))
- g. Xcel proposed automatic energy data transfer to Energy Star Portfolio Manager as part of a CIP pilot [Energy Benchmarking Program](#).
- h. Automatic energy data transfer into B3 for Xcel customers is planned for early 2016 ([B3 newsletter](#)).

3. Other related resources

4. Funding sources identified

b. Adopt net-zero energy or low-energy goals for new buildings

Why this strategy is included: Minnesota SB 2030 is currently required for all publically bonded, new and substantially renovated buildings. This administrative action would allow cities in Minnesota to use SB 2030 as their required building energy code. This is not currently permitted with existing state code, but SB 2030 can be added as an appendix code without requiring legislative approval. This could be implemented to apply to all buildings except residential structures with fewer than four units.

i. Specific recommendations for strategy implementation

1. Initiate Department of Labor and Industry (DLI) rulemaking to add Minnesota SB 2030 as an Appendix option to the MN State Building Code.
2. Expand SB 2030 Energy Standard Tool to handle additional building types.
3. Extend B3 Benchmarking access to all building owners as a tool to verify compliance (see benchmarking strategy).
4. Approve SB 2030 at the city building official level.
5. Train architects, engineers, contractors and code officials.

ii. Success factors

1. Cities are able to use SB 2030 as their required building code.
2. SB 2030 Energy Standard Tool supports the majority of building types.
3. Design teams have knowledge required to achieve SB 2030 Energy Standards.
4. Cities have expertise and capacity required to verify SB 2030 compliance.

iii. Identified Champions/Key Participants (by strategy #)

- 1.
- 2.
- 3.
- 4.
- 5.

iv. Metrics

1. Number of SB 2030 buildings
2. Square footage of SB 2030 buildings
3. Annual energy saved by SB 2030 buildings (as compared to the average building)
4. Annual CO₂e emissions prevented by SB 2030 buildings (as compared to the average building)
5. Number of cities that have adopted SB 2030 into their building code

v. Additional information

1. Cross sector opportunities and synergies

- a. Improved energy data access is required for verifying compliance during building operations.

2. Ongoing MN initiatives

- a. [CSEO](#): Taking this action is comparable to a first step in the overall implementation of the proposed “Zero Energy Ready” strategy.
- b. In St. Paul, entities that receive tax incentives/abatement are required to participate in the SB 2030 program.

c. Maplewood has adopted a green code for city-owned buildings.

3. Other related resources

4. Funding sources identified

c. Enhance energy data access through Green Button

Why this strategy is included: Green Button is a data standard that provides consumers with easy access to their energy use data to identify energy and cost savings. Green Button *Download My Data* allows the customer to download their own data from their utility account. Green Button *Connect My Data* allows customers to authorize a web-based energy management tool to automatically retrieve their energy use data to simplify energy analysis and benchmarking. Green Button is a platform-neutral data standard that can be used for Energy Star Portfolio Manager, B3, and other online energy management applications.

i. Specific recommendations for strategy implementation

1. Implement pilots of Green Button *Connect My Data* with several leading utilities (Xcel Energy, CenterPoint Energy, Minnesota Valley Electric, Minnesota Power). Once basic functionality has been implemented, expand data to include demand usage and 15 minute interval data.
2. Provide training for utilities on implementing Green Button.

ii. Success factors

1. Utility billing system must have functionality to work with Green Button.
2. Implementation can be facilitated with AMI.

iii. Identified Champions/Key Participants (by strategy #)

1. Fresh Energy
- 2.

iv. Metrics

1. Number of MN utilities offering Green Button *Download My Data*
2. Number of MN utilities offering Green Button *Connect My Data*

v. Additional Information

1. Cross sector opportunities and synergies

- a. Easy access to energy use data facilitates benchmarking and behavioral strategies

2. Ongoing MN initiatives

- a. [12-1344](#) Energy Data Access/Data Privacy docket
- b. Xcel currently provides Green Button *Download My Data* for residential and commercial customers. Xcel's Green Button provides data on kWh and cost in daily intervals for electric customers (therms and \$ is provided for NG customers. Electric demand use data is not currently provided).

3. Other related resources

- a. <http://www.greenbuttondata.org/>

- b. <http://energy.gov/data/green-button>
- c. Resource: [Integrating Benchmarking into Utility Conservation Improvement Programs to Capture Greater Energy Savings](#), prepared by Weidt Group for MN Department of Commerce, August 2014

4. Funding sources identified

d. Promote behavioral energy efficiency strategies

i. Specific recommendations for strategy implementation

- 1. Expand education about energy reduction through behavioral strategies.
- 2. Include a citywide energy challenge as a best practice for GreenStep Cities.
- 3. Initiate an energy challenge among GreenStep cities with recognition for cities that show significant improvement (similar to Georgetown energy prize).

ii. Success factors

- 1. Improved energy data access, such as through Green Button, will facilitate tracking the impact of behavioral strategies.
- 2. Encourage local government action to promote an energy challenge.

iii. Identified Champions/Key Participants (by strategy #)

- 1.
- 2.
- 3.

iv. Metrics

- 1. Number of GreenStep Cities that have committed to implementing a citywide energy challenge

v. Additional information

1. Cross sector opportunities and synergies

- a. Improved energy data access, such as through Green Button, will facilitate tracking the impact of behavioral strategies
- b. Behavioral strategies can enhance effectiveness of Local Government Action

2. Ongoing MN initiatives

- a. Resource: [Energy Efficiency Behavioral Programs: Literature Review, Benchmarking Analysis, and Evaluation Guidelines](#), prepared by Illume Advising for MN Department of Commerce, May 2015
- b. [Schools for Energy Efficiency](#): this program for K-12 schools to save energy through user behavior provides strategies for efficient operations, energy awareness materials for staff and

students, training, and utility tracking for immediate and sustainable savings.

- c. [Minnesota ENERGY STAR Challenge](#): provides participating building owners with free education and assistance regarding benchmarking, energy reduction strategies, and financing.
- d. Minnesota Valley Electric Cooperative [Beat the Peak Energy Challenge](#): a reward program for reducing electricity use during peak times
- e. [Georgetown University Energy Prize](#): Duluth is participating in this nationwide program where communities compete to raise the bar on energy efficiency.

3. Other related resources

4. Funding sources identified

- a. CIP
- b. CARD

e. Support district energy and combined heat and power (CHP)

Why this strategy is included: Over the last two years the MN Department of Commerce has been conducting a robust effort to examine opportunities for increasing the deployment of CHP in MN. As a result of a stakeholder engagement process, technical research studies, and evaluation of resource potential a MN CHP Action Plan was published in October 2015. The Action Plan provides a roadmap for specific actions that will be undertaken in the next several years to improve the policy, regulatory, and technical environment in order to take advantage of CHP implementation opportunities.

i. Specific recommendations for strategy implementation

- 1. Analyze and map opportunities for waste heat.
- 2. Conduct CHP market analysis for different regions of the state and map assets available in the region.
- 3. Six priority actions from [DOC CHP Action Plan](#)
- 4. Establish a CHP evaluation methodology and criteria that would provide a fair, accurate, and comprehensive assessment and valuation of CHP projects.
- 5. Conduct an empirical study and granular analysis that would map opportunities for topping-cycle and bottoming-cycle CHP projects.
- 6. Address knowledge gaps and define options for CHP education and training.
- 7. Address a range of CHP ownership problems and solutions including utility resource planning, ratepayer risks, market power, and behind-the-meter operations.
- 8. Explore CHP supply-side investments as an eligible electric utility infrastructure (EUI) resource under the Conservation Improvement Program (CIP).

9. Introduce transparent, unbundled pricing for standby rates.
- ii. **Success factors**
 1. Perform region-by-region market analysis to pinpoint project development opportunities.
 2. Use qualified operation and maintenance technicians to service projects.
 3. Reference available case studies or examples of successful CHP projects at different sectors.
- iii. **Identified Champions/Key Participants** (by strategy #)
 - 1.
 - 2.
 - 3.
 - 4.
 - 5.
 - 6.
 - 7.
 - 8.
 - 9.
- iv. **Metrics**
 1. Total fuel savings (Btu)
 2. Total CO₂ emissions savings (lbs CO₂)
- v. **Additional information**
 1. **Cross sector opportunities and synergies**
 - a.
 2. **Ongoing MN initiatives**
 - a. [MN Technical Assistance Partnership](#) at the University of Minnesota works with MN businesses to develop and implement industry-specific solutions to prevent pollution, maximize efficient use of resources, and reduce energy use and costs.
 - b. [15-115](#) PUC docket on standby rates.
 3. Funding sources identified

VI. **Industry and Agriculture**

a. **Commercialize advanced biofuels and biobased chemicals**

Why this strategy is included: Minnesota has a strong history of supporting the development biobased industries. The state has 21 corn ethanol plants with 1.1 billion gallons of production capacity and 63 million gallons of biodiesel production capacity. Minnesota has also led the nation in deploying biofuel infrastructure that expands consumer choice at the pump. In October of 2015 the MN Department of Agriculture

was awarded \$8 million from the U.S. Department of Agriculture’s Biofuel Infrastructure Partnership that will be matched by in-kind contributions from in-state partners. This new investment is estimated to assist with the installation or retrofit of 620 pumps and related equipment at approximately 165 retail stations. Minnesota has the opportunity to expand biobased industry development by taking advantage of new value-added opportunities for our agricultural and forestry sectors to produce advanced biofuels and biobased chemicals.

i. Specific recommendations for strategy implementation

1. Identify and address project permitting barriers by working with the MN Pollution Control Agency to implement strategies for efficient project permitting.

ii. Success factors

1. Develop adequate refueling infrastructure to meet consumer demand and consume a greater percentage of fuel produced in-state.
2. Encourage efficient and transparent regulatory process for bringing new projects online.
3. Improve access to capital for project financing.
4. Use public research dollars to develop common intellectual property that can lead to spin-off projects.

iii. Identified Champions/Key Participants (by strategy #)

- 1.

iv. Metrics

1. Gallons produced (liquid advanced biofuels)
2. MMbtus produced (gaseous advanced biofuel such as Bio Compressed Natural Gas)
3. Renewable Information Numbers (RINs) generated in MN (liquid and gaseous advanced biofuels under EPA Renewable Fuel Standard)
4. Pounds produced (biobased chemicals)
5. Reductions in GHG and criteria pollutants
6. Economic development - private and public investment dollars for individual projects

v. Additional information

1. Cross sector opportunities and synergies

- a. Renewable fuels as a strategy for increasing alternative transportation options for consumers along with electrification.
- b. A more robust advanced biofuel market can help commercialize anaerobic digestion projects that would clean and upgrade produced biogas as a source of transportation fuel.

2. Ongoing MN initiatives

- a. [Biofuel and biomass](#) energy crop production research at Central Lakes College

c. Promote industrial efficiency practices

i. Specific recommendations for strategy implementation

1. Promote Department of Energy programs as a resource for industry to improve energy productivity. Programs include the Advanced Manufacturing Office, Better Plants, and Superior Energy Performance.
2. Create peer-to-peer networks for different industry sectors to share best practices and information on energy management.

ii. Success factors

1. Identify programs available for different industry sectors to implement new technology and practices to save energy.
2. Make information resources readily available to connect industry with the technical experts, utility programs, available technology, and data.

iii. Identified Champions/Key Participants (by strategy #)

- 1.
- 2.

iv. Metrics

1. Energy saved (kWh and dekatherms)
2. Net cost savings
3. Number of plants participating in Department of Energy's Better Plants program
4. Avoided CO₂ emissions

v. Additional information

1. **Cross sector opportunities and synergies**
2. **Ongoing MN initiatives**
3. **Other related resources**

- a. [MN Technical Assistance Partnership](#) at the University of Minnesota works with MN businesses to develop and implement industry-specific solutions to prevent pollution, maximize efficient use of resources, and reduce energy use and costs.

4. Funding sources identified

d. Create an Advanced Energy Cluster Organization

Why this strategy is included: A cluster organization would coalesce Minnesota's energy and business community around the state's competitive strengths in the clean energy sector. A successful cluster organization would attract funding to the community (such as federal grants); coordinate research across the private, public and nonprofit sectors; and be prepared to take advantage of business opportunities as they arise, in order to develop a cluster of advanced energy businesses in Minnesota whose products are sold around the world.

i. Specific recommendations for strategy implementation

1. Convene an initial leadership team with the objectives of:
 - a. Determining Minnesota’s competitive strength in an advanced clean-tech industry
 - b. Interview local corporations: What is their vision and strategy for the clean energy space?
2. Identify a few leading potential board members, ask for commitment on initial setup of organization and to help raise seed money
3. Winning a grant or other initial funding source to advance this vision, and/or asking leadership team to identify initial funding sources (note Colorado established theirs with one full-time director and basic operating budget of about \$100k to start).
4. Building the basic elements of a [business/organizational plan](#) to guide the org and its efforts, with essential staff (see example of [Colorado CleanTech Action Plan](#)).
 - a. Identify a potential ED to hire
 - b. Identify initial collaborating organizations and companies and socialize the effort with them as initial potential “sponsors.”
 - c. Establish clear leadership consensus on cluster mission, goals and strategy
 - d. Clear competitive differentiator (clearly articulate what the cluster organization is and isn’t)
 - e. Identify where MN accelerates a current industry or fosters a new one
 - f. Engage with likely partners (state, universities, labs, businesses, economic development orgs, etc.)
 - g. Build upon core regional strengths
 - h. Measure success metrics annually
 - i. Identify and nurture ongoing funding partners
 - j. Define the decision-making process

ii. Success factors

1. Involve the right stakeholders.
2. Engage private sector leadership.
3. Encourage public sector participation.
4. Establish sustainable organizational business model:
 - a. 501c3, 501c6 (allows lobbying), or B Corp?
 - b. Grant, corporate, state balanced funding mix - with a voice at the table but not captive to any one agency or corporation
 - c. Revenue generating activities can include networking events, industry education, workforce development, new business funding competitions, award galas, etc.

- d. CCIA model below: 1/3 of money comes from sponsors, another 1/3 from members, and another 1/3 from events/programs such as annual gala
 - 5. Consider role of education and workforce development.
 - 6. Establish clear cluster goals that capitalize on regional strengths, resources and existing ambition. Examples:
 - a. Food/agriculture/water process efficiency in MN
 - b. Biofuels/green chemistry
 - c. Building efficiency niches (e.g. Honeywell, controls, big data)
 - d. Sector-specific industry collaborations have been successful for CCIA
 - 7. SXSW Eco cleantech panel in Austin (2014) identified the following important considerations:
 - a. Understand the industries collaborating with including regional strengths
 - b. Building relationships between the public and private sectors
 - c. Understand the role of big data
 - d. Role of state policy in efforts
 - e. Be willing to embrace big bets
- iii. **Identified Champions/Key Participants** (by strategy #)
 - 1. [2100 Advisors](#) (Justin Kaster): Minnesota firm and local entrepreneur interested in seeing this developed in MN.
 - 2. Others?
- iv. **Metrics**
 - 1. Clean Energy funding attracted/matched
 - 2. Clean energy projects created
 - 3. Number of industry partners
 - 4. Energy saved by projects created through the cluster organization
 - 5. GHG and criteria air pollutants reduced by projects created through the cluster organization
- v. **Additional information**
 - 1. **Cross-sector opportunities and synergies**
 - a. Food/agriculture/water process efficiency in MN
 - b. Biofuels/green chemistry
 - c. Building efficiency niches (e.g. Honeywell, controls, big data)
 - d. As an economic development opportunity, may align well with state, university or chamber of commerce economic development initiative
 - e. Organization may foster pilots and public/private partnership opportunities in any one sector or multiple sectors
 - 2. **Ongoing MN initiatives**

- a. Clean Energy Economy Minnesota business group (McKnight Foundation/Gregg Mast)

3. Other related resources

a. Leading case studies:

- i. [NECEC](#). The Northeast Clean Energy Council activities include networking, business support, policy leadership, events to support finance, etc.
- ii. [Strategic Partner Network](#): working sessions to grow partnerships with startups and growth companies, develop regional markets in electricity system innovation, smart buildings and cities, and advanced materials and manufacturing.
- iii. [Clean Tech Summit](#): targeted networking events for entrepreneurs, a business competition, and a startup showcase with awards ceremony celebrating the region's top cleantech innovators.
- iv. [CCIA](#). Colorado Cleantech Industries Association promotes CO clean-tech industry. Industry-led with industry-focus. Provide advocacy, policy leadership (state and federal), business development, education.
- v. [Colorado Clean Tech Action Plan](#). Hired Navigant Consulting to do this.
- vi. Convene industry for capacity building, education training, communications on behalf of industry
- vii. Research & disseminate reliable data about industry trends and data in CO
- viii. Provide a cluster "single point" of contact to negotiate and partner with government, economic development orgs, research institutions, labs, etc.
- ix. Unique: [Energy Fellows Institute](#)
- x. Annual clean-tech awards/gala.
- xi. [LACI](#): Los Angeles Clean-Tech Incubator.
- xii. [NextEnergy](#): 501(c)(3) goal of advancing energy and transportation investment and job creation in Michigan.

4. Funding Opportunities Identified

- a. [SBA Cluster Initiative](#). U.S. Small Business Administration is investing in regional clusters throughout the United States.

VII. Local Planning and Action

a. Incorporate energy into local government policy, planning, and regulatory frameworks.

Why this strategy is included: Local governments have the ability to shape any development within their boundaries – including the future energy system. They have a unique set of policy and regulatory tools and incentives through which they can and do influence development and encourage private sector action, and local government operations are themselves large consumers of energy. The explicit integration of energy and climate into policy and planning processes empowers local entities to take action on best practices as well as enables implementation of cross-sector opportunities by non-public entities.

i. Specific recommendations for strategy implementation

1. Collect and analyze baseline data on energy use and greenhouse gases on a community level.
2. Develop a framework for cities to use to incorporate energy, climate, and resilience into current round of Twin Cities Metro comprehensive plan updates.
3. Provide toolkits and models for comprehensive plans to local jurisdictions outside the Twin Cities Metro region.
4. Engage and support tribal governments in identifying how various tools to address energy, climate, and resilience can be tailored to match their local authority and regulatory processes.
5. Develop energy and climate goals and action plans at a community level
6. Provide state support for local planning
 - a. Data and analysis
 - b. Statewide local government energy challenge

ii. Success factors

1. Dedicated leadership is a community's most important asset – time needs to be spent identifying and cultivating strong leaders.
2. Leadership teams will be more effective if they are representative of their constituency (e.g., inclusive of the business community, neighborhood groups, and other groups in addition to city or NGO leadership).
3. An initial leadership team can engage advisory councils in order to build more community ownership.
4. A great process is more important than a great product and more likely to lead to impact.
 - a. Needs to be transparent and collaborative, and lead to a shared vision.

5. At the end of a planning process, a community should have built local capability (e.g., knowledge, a committed leadership team) in addition to developing a plan.
6. Outcomes are more likely to be reached if supported by staffed resources (city, a backbone organization, or local business).
7. A community energy workshop can serve as a catalyst for publicly launching the community energy planning process.
8. Start with an assessment of the current energy landscape and communicate it well; then consider a higher-level, what's possible approach in defining the opportunity.
9. Do more in-depth analysis as is appropriate and with the right partners (such as utilities).
10. Strategies and tactics should be specific, including responsible stakeholders, enabling actions such as new legislation and policy, and clear initial steps that folks can take to get started.
11. Seeking private sector partners or grant funding opportunities for demonstration cases or pilot programs is a good way to launch, refine, improve projects/initiatives.

iii. Identified Champions/Key Participants (by strategy #)

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.

iv. Metrics

1. Energy use/energy intensity reduced
2. Reduced in greenhouse gas and criteria air pollutant emissions
3. Reduced energy bills for residents, businesses, local government operations
4. Percent of Minnesotans living in energy poverty
5. Resilience?: metric TBD

v. Additional information

1. **Cross sector opportunities and synergies**
 - a. Building and thermal energy efficiency and increased deployment of distributed energy resources
 - b. Transportation and land use planning
 - c. Economic development
2. **Ongoing MN initiatives**

- a. GreenStep Cities Resilience Best Practice #29 (set of practices being added on energy infrastructure resilience, vulnerable population assessments)
- b. Metropolitan region’s comprehensive plan updates are beginning now

3. Other related resources

- a. Metropolitan Council Local Planning Handbook
- b. Grow Solar Local Government Toolkit
- c. Minnesota Climate Change Vulnerability Assessment (MDH)
- d. [DOE Cities LEAP](#) (in beta: offers standardized, localized energy data and analysis to help cities integrate strategic energy analysis into decision making)
- e. Regional Indicators Initiative

4. Funding sources identified

- a. MPCA Environmental Assistance Grant (\$250,000)

b. Increase local government action through voluntary best practices

i. Specific recommendations for strategy implementation

- 1. Cities adopt best practices around energy to identify and take actions (e.g. through GreenStep Cities)
- 2. Acknowledge and address solar resources and development in comprehensive plans.
- 3. Explicitly address solar development in its varied forms (accessory use, principal use, technologies, etc.) in community’s development regulations.
- 4. Create a predictable, transparent, and consistent permitting process.
- 5. Invest in solar on public facilities and land.
- 6. Develop local programs to limit market barriers and enable private sector solar development.
- 7. Engage tribal governments to identify opportunities to increase solar development within their jurisdictions.

ii. Success factors

- 1. Provide local government staff with the appropriate education and resources to lead on action.
- 2. Increase community involvement through an environmental or energy commission or ad hoc citizen engagement.

iii. Identified Champions/Key Participants (by strategy #)

- 1. GreenStep Cities Partnership
- 2.
- 3.
- 4.

- 5.
- 6.
- 7.

iv. Metrics

1. Number of cities taking actions through the GreenStep Cities program
2. GreenStep star level of cities in the program
3. Geographical diversity of cities in GreenStep Cities program
4. Percent of individual communities, state living in energy poverty
5. GHG and criteria air pollutants reduced
6. Energy use/energy intensity reduced
7. Number of communities that adopt solar zoning ordinance
8. Number of communities that acknowledge solar energy in comprehensive plans
9. Capacity of solar installations in communities

v. Additional information

1. **Cross-sector opportunities and synergies**
 - a. B3 benchmarking and building efficiency
2. **Ongoing MN initiatives**
 - a. ENERGY STAR® Challenge
 - b. Regional Indicators Initiative
 - c. Minnesota Clean Energy and Economic Opportunities (CSEO) initiative
 - d. Utility community solar programs
 - e. Clean Energy Resource Teams (CERTs)
 - f. Fresh Energy's Solar for All
3. **Other related resources**
 - a. GreenStep Cities and related technical assistance
 - b. Minnesota state agencies provide data, technical assistance and funding (MPCA, Commerce, DNR)
 - c. Metropolitan Council Local Planning Handbook
 - d. Grow Solar Toolkit
 - e. Optony Solar Road Maps
 - f. Free technical assistance through Grow Solar
4. **Funding sources identified**
 - a. Financing tools available from the state, nonprofits, and local energy financiers
 - b. MPCA environmental assistance grants
 - c. Solar incentives and rebates: Made in Minnesota, Solar*Rewards, Federal Investment Tax Credit (through 2016)

VIII. Cross-sector opportunities and synergies

IX. Taking a Step Back: What's Possible?

X. A Few Innovative Ideas for Further Consideration

- a. Transportation: Autonomous vehicles and energy use
- b. Transportation: Updating Pricing
- c. Energy Storage